The Curators of the University Chest have been authorised to guarantee an annual stipend of 100*l.* to a Demonstrator in Mineralogy, and to expend 90*l.* upon sanitary improvements in the Physiological Laboratory.

The annual grant to the Hope Department has been raised from 100*l.* to 110*l.*, and that to the Pitt Rivers Museum from 150*l.* to 200*l.*

The Board of the Faculty of Natural Science has issued new regulations relating to the special subjects of crystallography and mineralogy.

Mr. H. T. Gerrans has been elected a Delegate of the University Museum, and Mr. C. Leudesdorf a Visitor of the University Observatory. Mr. D. R. Wilson has been appointed lecturer in Chemistry at Magdalen College.

The 198th meeting of the Junior Scientific Club was held on Friday, February 24.—Mr. E. H. J. Schuster, New College, read a paper on "The heredity of acquired characters." —Mr. H. B. Hartley, Balliol, read a paper entitled "Notes on the origin of the Japanese." The author held that four waves of population have swept over Japan. The original inhabitants were a race of people who possessed the art of making pottery and lived in holes in the earth, roofed over with branches. These were completely driven out in prehistoric times by the Ainus, to whom the art of pottery making is still unknown. The Ainus were, in their turn, driven northwards or exterminated by an invasion of Mongols from Corea, and the latter now constitute the bulk of the population,—the round-faced type. Later still, apparently a second invasion of Mongols took place, and these, constituting the oval-faced type of Japanese, are now the aristocrats of the land. The antiquity of the first Mongol invasion is plainly evident; it is considered that the early Japanese, up to the fifth century, did not possess the art of writing.

CAMBRIDGE.—Mr. G. W. Walker, of Trinity College, has been elected to an Isaac Newton Studentship in Astronomy and Physical Optics.

The subject for the Adams Prize, 1901, open to all graduates of the University, is "Electric Waves." The successful candidate will receive about 225*l.*

Prof. Lewis has acquired for the Mineralogical Museum the Carne collection of Cornish minerals with their cabinets. The cost (475*l.*) has been almost entirely defrayed by contributions from members of the University and their friends, together with donations from the Clothworkers' and Fishmongers' Companies.

The Museums and Lecture Rooms Syndicate report on the urgent need of new buildings for the department of Botany, and propose that immediate steps be taken for their erection on the site recently assigned by the Senate.

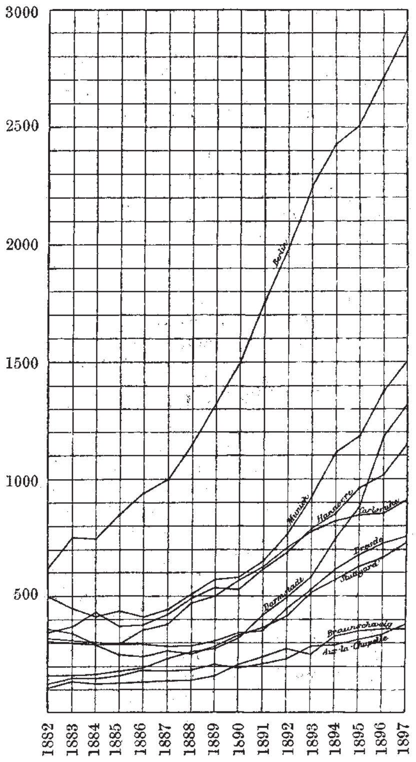
The Antiquarian Committee in like manner press for a new archæological museum, the present building, which was originally but a makeshift, being now utterly inadequate for the valuable ethnological and other collections.

A grant of 300*l* from the Works Travelling Scholars Fund is to be made to Mr. Skeat in aid of his scientific expedition to the Malay Peninsula.

WE understand that there is a vacancy in the Examinations Department of the City and Guilds of London Institute, for the post of assistant to the superintendent, from whom particulars of the appointment may be obtained. Applicants are expected to have graduated, and to have a sound knowledge of some branch of science and educational experience.

A COPY of the Calendar, for 1899, of the University of New Brunswick, Fredericton, has been received. Among the University medals, prizes and scholarships, we notice that a gold medal is offered for competition among undergraduates this year for the best essay on "The aims and methods of modern science." As showing how the alumni help their alma mater, we may mention that the Alumni Association has founded several scholarships and prizes, and that the graduation classes of 1894 and succeeding years have contributed various gifts to the University.

THE steady increase in the number of students who have taken up advanced courses of technical science in Germany during the past fifteen years is shown in the accompanying diagram, reproduced from an article on the new laboratories of the Zürich Polytechnic, contributed to the *Revue Générale des Sciences* by M. Pierre Weiss. There are in Germany nine polytechnics—it is hardly necessary to explain that they are concerned with much more advanced work than our polytechnic institutions—the one having the smallest number of students being Brunswick, with 363 students, while Berlin, with 2906 students, is the most frequented. The total number of polytechnic students is 10,000. If the average period of study is taken to be three years, the number of trained technical men who become available every year is thus about three thousand. The diagram shows clearly the uniform rise in the number of students of industrial science in all the German polytechnics since about 1886 or 1887.



Number of students in German Polytechnics every year from 1882 to 1897

## SCIENTIFIC SERIALS.

*Symons's Monthly Meteorological Magazine*, February.—Results of meteorological observations at Camden Square (North-west London) for forty years, 1858–97. This is a second series of tables containing the means and other details for each separate year, while the former series contained only the averages, &c., for the whole period. The results now published will be very valuable for reference. The present number contains the observations for January.—Climatological records for the British Empire in 1897. The table contains the results for sixteen representative localities. Most of the extremes have occurred at the same stations in other years. The highest temperature in the shade was 110°·8 at Adelaide, and the lowest −41°·0 at Winnipeg; the former was also the driest station, mean humidity 59, and had the highest temperature in the sun, 166°·3. The dampest station was Esquimalt, mean humidity 86. The greatest rainfall, 83·64 ins., occurred at Grenada, and the least, 14·22 ins., at Malta. Strange to say, Grenada had the least cloud, average amount 2·5. This value is unprecedented in the last twenty-one years, the nearest approach to it being 2·9 at Malta, in 1885.

*Wiedemann's Annalen der Physik und Chemie*, No. 1.—Susceptibilities of some metals, by E. Seckelson. The magnetic susceptibility of all metals examined is independent of the field in a direction normal to the lines of force.—Structure of the kathode light and nature of Lenard's rays, by E. Goldstein.

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Following up his studies of the triple structure of the kathode light, the author finds that the third kathode layer consists of rectilinear rays, which, however, do not proceed from the kathode itself, but from every point along the path of a ray of the second layer. They are produced, so to speak, by a diffused reflection produced at the surfaces of the gaseous particles. If $K_2$ rays impinge upon a solid substance, reflected kathode rays are produced. If the solid is thin enough, some of the rays penetrate it, and we have Lenard rays on the other side.—Measurement of very small induction coefficients, by H. Martienssen. The method used depends upon the phase displacement produced by the self-induction in question upon an alternating current. Coefficients down to a few thousand cm. are thus easily measured, the inferior limit hitherto attained having been $10^6$ cm.—Air resistances determined by means of a new rotation apparatus, by O. Mannesmann. Discs are mounted at the end of a horizontal arm, and are turned about a vertical axis by means of a water-power or electric motor. The air resistance encountered by them is indicated by enabling the disc to slide backwards in its mounting, in a direction contrary to the direction of motion. In sliding back it pulls a string which passes over a pulley on the axis of rotation, and supports a weight which is thus pulled up. The amount of raising is indicated by an aluminium pointer on a scale. Thus the amount of air resistance can be read off at any instant. The author finds that warm air offers, if anything, a greater resistance than cold air. The resistance encountered by a perforated surface is smaller in proportion to its remaining surface than an unperforated surface. This fact has a practical application to sailing practice.—A new type of volumenometers, by A. Oberbeck. Two parallel glass tubes ending in glass vessels are fixed side by side on a board which can be tilted to any desired angle. The vessels have ground edges, and can be hermetically closed by means of greased glass plates. The tubes join at the other end and communicate with a reservoir of mercury. On closing the vessels and lowering the other end, the mercury columns descend by equal amounts in the two tubes. But if the body whose volume is to be determined is previously inserted in one of the vessels, the mercury in the corresponding tube does not descend as far as before. The author shows how to calculate the volume of the body from the data thus obtained.

## *SOCIETIES AND ACADEMIES.*

### LONDON.

**Royal Society,** January 26.—"On the Nature of Electro-capillary Phenomena. I. Their Relation to the Potential Differences between Solutions." By S. W. J. Smith, M.A. Communicated by Prof. A. W. Rücker, Sec. R.S.

The discrepancy between the Helmholtz theory of the capillary electrometer and the Nernst-Planck theory of the potential differences between solutions is discussed in this paper. A detailed examination of the relation between the phenomena from which the discrepancy arises, shows that these phenomena serve to corroborate the Nernst-Planck theory, and that they further throw considerable light upon the nature of electro-capillary phenomena.

It is shown that if the Nernst-Planck theory be true, the surface tension variation in the "descending" branches of the capillary electrometer curves is not solely due to an electrostatic effect of the kind discussed by Helmholtz; but that there is a further effect, dependent upon the nature and concentration of the solution employed in the electrometer.

The extent to which the Helmholtz theory may be true is discussed. It is concluded that this theory only suffices, in general, to give the variation in the potential difference at the capillary electrode. Whether the assumption is ever true, that the potential fall at the capillary electrode is zero when the maximum surface tension is reached, will depend upon whether there is any case for which, when the potential difference between the solution and the capillary electrode is very small, the non-electrostatic effect upon the surface tension can be neglected.

The non-electrostatic effect in the "descending" branch would appear to be practically independent of the nature of the anion, while that in the "ascending" branch is probably for the most part independent of the nature of the kation. Experiments have been made with the object of determining quantitatively the manner in which the surface tension variation depends upon the chemical nature and concentration of the solution, and the conditions under which such dependence may become negligible. The nature of these experiments is indicated in the paper.

February 2.—"On the Effects of Strain on the Thermo-Electric Qualities of Metals." By Magnus Maclean, M.A., D.Sc. Communicated by Lord Kelvin, F.R.S.

1. Seebeck (*Pogg. Ann.*, 1826) discovered the great effect that hardness, or softness, or crystalline structure, has on the thermo-electric properties of metals. Magnus made a number of experiments by winding a hard-drawn wire on a reel. Parts of this wire were softened and annealed. When heat was applied to the parts of the wire which were between unannealed and annealed, a thermo-electric current was obtained. In this way Magnus found that the current passed from soft to hard through the hot junction for silver, steel, cadmium, copper, gold, and platinum; and that it passed from hard to soft through the hot junction for German silver, zinc, tin, and iron.

2. Lord Kelvin describes, in vol. ii. of his "Mathematical and Physical Papers," a number of qualitative experiments to determine the direction of thermo-electric currents in the same metal when one part of it is left unstrained, and the other is—

(1) Permanently affected by application and removal of longitudinal stress;
(2) Permanently affected by application and removal of lateral pressure;
(3) Under a longitudinal stress (*a*) within its limits of elasticity, and (*b*) beyond its limits of elasticity;
(4) Hardened by twisting;
(5) Annealed.

3. He showed that for iron and copper permanent longitudinal extension gave the same effect as permanent lateral contraction; and that this effect for both was opposite to that experienced by them when under a stress which caused a temporary strain. Thus for a copper wire under a longitudinal stress the current was from the strained copper to the free copper across the hot junction, and the magnitude of the current increased with the increase of the longitudinal stress. If the stress were removed and the wire left with a permanent strain, the current was now from the free copper to the strained copper through the hot junction. Similar results were got with iron, only the direction of the current was in each case opposite to the direction of the current in the corresponding case for copper. The highest temperature used in these experiments was about 100° C.

4. To determine the *magnitude* of the thermo-electric effects obtained from any one metal, strained and unstrained, was the object in view in these experiments.

The metals so far tried are:—

(1) Copper wire from Messrs. Johnson and Matthey. This was pure electrotype copper wire with no impurity detected except an unweighable trace of iron.
(2) Copper wire, ordinary commercial, from Messrs. Johnson and Matthey. This was analysed[1] in the chemical laboratory of the University, and was found to contain:—

| | | |
|---|---|---|
| Copper | ... ... | 99·4 per cent. |
| Arsenic | ... ... | 0·44 per cent. |
| Lead | ... ... | 0·08 per cent. |
| Bismuth | ... ... | trace. |
| | | 99·92 per cent. |

(3) Copper wire, used for alloying with gold and silver, from Messrs. Johnson and Matthey. This also was analysed, and it contained 99·85 per cent. of copper.
(4) Copper wire from Glover. Chemical analysis showed that it contained 98·35 per cent of copper.
(5) Copper wire of Glover's manufacture, and supposed to be soft, and to have a very high conductivity. It contained 99·08 per cent. of copper and 0·22 per cent. of lead.
(6) Copper wire used in laboratory experiments. It contained 98·51 per cent. of copper.
(7) Lead wire, commercial. It contained 98·9 per cent. of lead.
(8) Lead wire, pure.[2] It contained 98·97 per cent. of lead.

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[1] All the chemical analyses stated in this paper were given by Mr. Anderson, of the Chemical Laboratory of this University.

[2] These specimens of commercial and pure lead wires were obtained from Messrs. Baird and Tatlock of Glasgow. Other specimens have been ordered elsewhere for a fresh determination.

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